

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY



(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 27 MAR 2006

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Applicant's or agent's file reference PF030161	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/EP2004/009789	International filing date (day/month/year) 02.09.2004	Priority date (day/month/year) 23.10.2003	
International Patent Classification (IPC) or national classification and IPC INV. G06T7/00			
Applicant THOMSON LICENSING et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 10 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 17.08.2005		Date of completion of this report 23.03.2006	
Name and mailing address of the International preliminary examining authority:  European Patent Office - Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840		Authorized officer Ellerbrock, T Telephone No. +49 30 25901-418 	

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/009789

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-7 as originally filed

Claims, Numbers

6, 7 as originally filed
1-5 received on 23.08.2005

Drawings, Sheets

1/2, 2/2 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☒ the claims, Nos. 1-5
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/009789

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-3
	No: Claims	1,4-7
Inventive step (IS)	Yes: Claims	
	No: Claims	1-7
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Referred documents

The following documents are referred to in this communication; the numbering will be adhered to in the rest of the procedure (for references, the following abbreviations are used: "P" = page, "C" = column, "L" = line, "F" = figure, "S" = section/paragraph, "SS" = subsection, "A" = abstract, "E" = equation, "D" = document; cited passages are written in *italics*:

D1: US 2003/016883 A1 (BARON JOHN M) 23 January 2003 (2003-01-23)

D2: FARROW G S D ET AL: "Detecting the skew angle in document images" SIGNAL PROCESSING: IMAGE COMMUNICATION, MAY 1994, NETHERLANDS, vol. 6, no. 2, 1994, pages 101-114, XP000450543 ISSN: 0923-5965

D3: US-B1-6 263 097 (DEWAELE PIET) 17 July 2001 (2001-07-17)

D4: EP-A-0 400 881 (AMERICAN TELEPHONE & TELEGRAPH) 5 December 1990 (1990-12-05)

D5: US-A-5 664 027 (ITTNER DAVID JACK) 2 September 1997 (1997-09-02)

D6: PETER HABERÄCKER: "Digitale Bildverarbeitung - Grundlagen und Anwendungen" 1985, CARL HANSER VERLAG MÜNCHEN WIEN , XP002279457

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Amendments extending the content of the application as filed (Art. 19(2))

The amendments filed with the International Bureau under Article 19(1) introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 19(2) PCT. The amendments concerned are the following (added subject matter is indicated by **bold italic letters**, deleted features are represented by underlined text in [*brackets*):

■ **Amended Claims 1, 2-4**

Claim 1. Method for detecting the orientation of an image comprising the steps of:

- detecting (E1, E2, E3) the lines in the image,
- calculating (E4), for each line detected, attributes (F)

(*) **...characterizing each line, said attribute classifying each line as being an horizontal or vertical line,**

...characterized in that it comprises the step of

- detecting (E5) the orientation of the image

(**) **...according to the ratio of horizontal lines and vertical lines in the image.**

(#)[... as a function of the attributes of the set of lines detected.]

Thus, the applicant has inserted features (*) and (**) and deleted feature (#).

It shall be noted that the application as filed discloses that

the orientation of the image depends on the ratio of the number of horizontal to vertical lines. In order to take the decision, in this embodiment, use is made of a learning-based decision system, of neural network type. P_n represents the attributes of straight line n in angular sector I . The inputs of the decision system are for each angular segment $S_i = [a_i, a_{i+1}]$

- *the number N_i of straight lines detected in the angular segment,*
- *A vector of attributes F_i dependent on the set of vectors of attributes of these straight lines F_n^i*

(page 6, lines 1-12)

Thus, although the application as filed discloses that *the orientation of the image depends on the ratio of the number of horizontal to vertical lines* it does not disclose a method detecting the orientation of the image **according to the ratio of horizontal lines and vertical lines in the image** (feature (**)). The application as filed neither discloses calculating, for each line detected, attributes (F) **said attribute classifying each line as being an horizontal or vertical line** (feature (**)). Rather, it discloses that for each straight line detected in the image, a set of K attributes are computed during step E4 (number of points on the line, dispersion of the set of points, distances between points not connected so as to favour the lines that correspond to real objects, etc.) represented in the form of a vector of attributes F Each line can be weighted. The lines whose points are not actually aligned have little probability of being lines and

can therefore undergo a weighting so as to be taken into account less in the orientation decision.

(page 5, lines 10-20)

The assertion that *the orientation of the image depends on the ratio of the number of horizontal to vertical lines* does not imply that the orientation only depends on said ratio and that no other image features have to be taken into account to unambiguously determine the orientation. Thus, the application as filed does neither implicitly regard a method determining the orientation of an image by said ratio. Rather, the application discloses the usage of a frequency statistics of a plurality of image line inclinations and a weighting of each line. This weighting is based on line attributes as defined on page 5, lines 11-12.

These features (very broadly covered by deleted feature (#)) are indispensable for the method to work in an manner *robust for all type of images* (page 1, line 31) taken e.g. by *digital cameras* (page 1 lines 14-25). The reasons are as follows:

- there may be a number of short lines not related to the image orientation at all
- lines horizontal or vertical, resp., in the scene may not be horizontal or vertical, resp., in the image due to the perspective projection of the camera
- lines horizontal or vertical, resp., in the scene may not be horizontal or vertical, resp., in the image because the user may accidentally hold the camera slightly inclined

It follows that line attributes have to be regarded and that also line angles other than substantially 0 or 90 degrees have to be taken into account in relation to said attributes to achieve the intended technical effect.

Thus, deleted feature (#) is regarded to be **essential** for the subject matter.

It results that **amended claim 1** and consequently **depending claims 2-4 extend beyond the subject matter as filed**, contrary to Article 19(2) PCT.

As claims 6 and 7 are not amended, the further **examination is therefore based on the claims as originally filed**.

Remark: Amended claim 1 is **neither** regarded to be **novel** because the determination of the orientation of a (text)image by the ratio of the numbers of horizontal and vertical (text)lines is known from scanners and OCR (Optical Character Recognition) methods. Amended claim 1 is drafted that broad that it covers these known devices and methods.
(By the way, amended claim 1 is **neither inventive over** e.g. D5 (C4,L49-65)).

2. Objections according to Article 33(2) PCT (Novelty)

The application does not meet the requirements of Article 33(2) and 33(3) of the PCT, because the following claims are not novel and thus also do not involve an inventive step. For references, the following abbreviations are used: "P" = page, "C" = column, "L" = line, "F" = figure, "S" = section, "PG" = paragraph, "A" = abstract, "E" = equation, "D" = document; passages cited from the application are written in *italics*, passages cited from prior art documents are put in "quotation marks"):

■ Claims 1,6,7

Claim 1:

Document D1 discloses all following features of **claim 1** of the application:

1. Method for detecting the orientation of an image, characterized in that it comprises the steps of:

(D1: P1, PG[0005])

- detecting (E1, E2, E3) the lines in the image,

(D1: P2, PG[0012], L8-11)

- calculating (E4), for each line detected, attributes (F) characterizing each line,

(D1: P2, PG[0012], L11-16)

The orientation or angle, respectively, and the length of the lines are detected in the method of D1. Orientation or angle, respectively, and length are *attributes (F) characterizing each line*.

- detecting (E5) the orientation of the image as a function of the attributes of the set of lines detected.

(D1: P2, PG[0012], L20-29)

Thus, claim 1 is not novel. The same applies to claims 6 and 7.

Therefore, **claims 1,6,7 are not novel** according to Art. 33(2), PCT, and thus also **lack an inventive step** according to Art. 33(3), PCT.

■ **Claim 4**

Document **D1** discloses the all features of **claim 4** of the application:

4. Method according to one of the preceding claims, characterized in that it comprises a step of detecting the inclination of the lines detected,
(D1: P2, PG[0012], L13-16)

The orientation or angle, respectively, of the lines are detected in the method of D1.

...and that the attributes characterizing the lines detected of the image comprise parameters relating to the inclination of the lines.
(D1: P2, PG[0012], L13-16)

Orientation or angle, respectively is an *attribute... characterizing each line.*

Therefore, **claim 4 is not novel** according to Art. 33(2), PCT, and thus also **lacks an inventive step** according to Art. 33(3), PCT.

■ **Claim 5**

Document **D1** discloses the all features of **claim 5** of the application:

5. Method according to one of the preceding claims, characterized in that the lines detected are classed according to their orientation.
(D1: P2, PG[0012], L13-16)

For lines detected according to the method disclosed in D1 it is checked whether they deviate by 5 degrees from the horizontal or vertical orientation. This means that the lines are classified as being horizontally or vertically oriented and thus they are *classed according to their orientation.*

3. Objections according to Article 33(3) PCT (Inventive step)

The application does not meet the requirements of Article 33(3) PCT, because the following claims do not involve an inventive step.

■ Claim 2

Claim 2 differs from the **closest prior art document D1** by

- (1) - *detecting (E1) contours,*
- (2) - *thresholding (E2) the gradient of luminance of the points belonging to each contour ..*

The **objective technical problem** solved by these features can be stated as:

- How can lines be found in an image?

As concerns feature (1): lines, whether straight or curved, form part of the contours of image objects. Thus, it is obvious for the skilled person, to consider contours or boundaries, respectively.

As concerns feature (2): This is a one of the standard methods used to extract contours (see e.g. D6, P314-315). There is also a hint in D1, because in D1 edges are detected and feature (2) describes a standard method for finding edges. Thus, the skilled person would also consider feature (2).

Therefore, **claim 2 does not involve an inventive step** according to Art. 33(3), PCT.

■ Claim 3

3. Method according to one of the preceding claims, characterized in that the step (E5) of detecting the orientation consists of detecting by learning the orientation of the image.

Learning methods as e.g. neural networks are widely used in the domain of pattern recognition, computer vision and image analysis (see e.g. D4, P2,L53-P3,L5).

The skilled person would therefore regard also a learning method.

Therefore, **claim 3 does not involve an inventive step** according to Art. 33(3),

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PCT.

Remark: The expression *detecting by learning the orientation* is not clear, because it is not clear, what *learning* exactly means here.

4. Reasoned Statement with regard to industrial applicability (Art. 33(4), PCT)

Claims 1-7 are susceptible of industrial applicability because the method claimed can be used for digital cameras or for image display devices or image display programs.

New Claims

23. 08. 2005

1. Method for detecting the orientation of an image, comprising the steps of:
 - detecting (E1, E2, E3) the lines in the image,
 - calculating (E4), for each line detected, attributes (F) characterizing each line, said attribute classifying each line as being an horizontal or vertical line,
 - characterized in that it comprises the step of
 - detecting (E5) the orientation of the image according to the ratio of horizontal lines and vertical lines in the image.
2. Method according to Claim 1, characterized in that the step of detecting the lines in the image comprises the substeps of
 - detecting (E1) contours,
 - thresholding (E2) the gradient of luminance of the points belonging to each contour detected.
3. Method according to one of the preceding claims, characterized in that the step (E5) of detecting the orientation consists of detecting by learning the orientation of the image.
4. Method according to one of the preceding claims, characterized in that it comprises a step of detecting the inclination of the lines detected, and that the attributes characterizing the lines detected of the image comprise parameters relating to the inclination of the lines.
5. Method according to one of the preceding claims, characterized in that the lines detected are classed according to their orientation.
6. Device for detecting the orientation of an image, characterized in that it comprises means for:
 - detecting the lines in the image,
 - calculating, for each line detected, attributes (F) characterizing this line,
 - detecting the orientation of the image as a function of the attributes of the set of lines detected.

- 5 7. Computer programme product, characterized in that it comprises programme code instructions able to implement the method according to one of Claims 1 to 5 when the programme is executed on a computer.